

**Procedure Cancelled 2/16/12, Superseded by TFC-ESHQ-S\_IH-C-53**

USQ #RPP-27195

<b>HEARING CONSERVATION PROGRAM</b>	<b>Manual</b>	<b>ESHQ</b>
	<b>Document</b>	<b>TFC-ESHQ-IH-STD-06, REV A-3</b>
	<b>Page</b>	<b>1 of 15</b>
	<b>Issue Date</b>	<b>November 29, 2010</b>
	<b>Effective Date</b>	<b>November 29, 2010</b>

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**TABLE OF CONTENTS**

1.0	PURPOSE AND SCOPE .....	2
2.0	IMPLEMENTATION .....	2
3.0	STANDARD .....	2
3.1	Hazard Identification and Evaluation .....	2
3.2	Exposure Control .....	3
3.3	Medical Surveillance.....	4
3.4	Training.....	6
3.5	Industrial Hygiene Support .....	6
4.0	DEFINITIONS .....	7
5.0	SOURCES.....	8
5.1	Requirements .....	8

**TABLE OF ATTACHMENTS**

ATTACHMENT A - APPLYING THE HEARING CONSERVATION PROGRAM .....	9
ATTACHMENT B - METHODS FOR ESTIMATING THE ADEQUACY OF HEARING PROTECTOR ATTENUATION.....	14

**TABLE OF TABLES**

Table 1. Approved Hearing Protectors.....	11
Table 2. Approved Hearing Protectors Available From Stores. ....	13

**1.0 PURPOSE AND SCOPE**

(5.1.1, 5.1.2, 5.1.3, 5.1.4, 5.1.5)

The hearing conservation program establishes standards to anticipate, identify, evaluate, and control occupational noise hazards. It applies to all WRPS managed facilities and operations where work activities may result in employee exposure to continuous, intermittent, impulsive, and impact noise at or above 85 decibels, A-weighting scale (dBA), time-weighted average, or an equivalent noise dose. All noise exposure is integrated into one measurement.

The hearing conservation program is based on OSHA 29 CFR 1910.95, 29 CFR 1926.52 and 101, and the ACGIH guidelines in the “Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.” The noise exposure limits, noise criterion, and dB exchange rate are based on the American Conference of Governmental Industrial Hygienists (ACGIH) guidelines, as they are more restrictive than the corresponding OSHA requirements.

See Attachment A for application of the hearing conservation program. See Attachment B for methods for estimating the adequacy of the hearing protection attenuation.

**2.0 IMPLEMENTATION**

This standard is effective on the date shown in the header.

**3.0 STANDARD****3.1 Hazard Identification and Evaluation**

Line management shall identify and evaluate hazards according to the following:

1. Identify noise sources (portable and stationary) or work activities that could expose workers to the ACGIH threshold limit value of 85 dBA 8 hr time-weighted average, or equivalent noise dose.

NOTE: Use the job hazard analysis, job safety analysis, or other appropriate hazard identification processes such as qualitative exposure assessments.

2. Request assistance from Industrial Hygiene in conducting a noise exposure assessment and quantifying noise exposures when historical monitoring data, type of operation, or duration of work in high noise areas indicate employee exposures equal to or greater than 85 dBA 8 hr time-weighted average, or equivalent noise dose.

NOTE: Table A-1 should be used in determining acceptable exposure levels.

3. Request that Industrial Hygiene repeat the noise survey whenever a change in production, processes, equipment, or controls may affect exposures, cause additional employees to be exposed at or above the threshold limit value, or require upgrading the hearing protection. Notify Industrial Hygiene of any subsequent change in process, equipment, or controls resulting in a decrease in ambient noise levels so that the area may be re-surveyed, as necessary.

<b>ESHQ</b>	<b>Document</b>	<b>TFC-ESHQ-IH-STD-06, REV A-3</b>
	<b>Page</b>	<b>3 of 15</b>
<b>HEARING CONSERVATION PROGRAM</b>	<b>Effective Date</b>	<b>November 29, 2010</b>

4. Ensure each employee who is exposed at or above 85 dBA 8 hr time-weighted average is notified of the monitoring results in a timely manner in writing. Provide the following information to affected employees:
5. Actual monitoring results.
  - Requirements for including employees in the hearing conservation program
  - Explanation of engineering controls or administrative controls, if any, which are planned to reduce noise levels or exposure to noise
  - Explanation of the types of hearing protectors available and the enforcement policy for wearing them when required by the hearing conservation program.

NOTE: It is recommended that all monitoring results, including those below the allowable exposure limit, be reported to all employees involved.

### **3.2 Exposure Control**

Line management shall apply exposure control according to the following:

1. Implement engineering and administrative controls to reduce noise levels, when possible and practical, if the noise source/work activity will result in exposures to 85 dBA 8 hr time-weighted average.

NOTE: Engineering controls such as source enclosure, vibration isolation, or exhaust muffling reduce noise levels. Administrative controls reduce the time that personnel work in high noise areas.

2. Require and ensure the use of hearing protection to further reduce exposure when engineering and administrative controls are not adequate to control exposure to 85 dBA 8 hr time-weighted average.

NOTE: It is recommended that personnel wear hearing protection whenever noise levels are 85 dBA or greater.

3. Ensure that hearing protectors are evaluated for the specific noise environments in which they will be used. Obtain assistance from Industrial Hygiene to determine if the hearing protectors will provide adequate noise attenuation.
4. Provide a selection of suitable hearing protectors to allow employees to select the most comfortable ones that will also provide the required protection.

NOTE: Table 1 provides a list of hearing protectors that meet product quality specifications, some of which are available through Stores (see Table 2). Industrial Hygiene may approve the purchase and use of other appropriate hearing protectors.

5. Noise hazard locations and areas identified by Industrial Hygiene should be posted with appropriate hazard warning signs stating that hearing protection is required, and should conform to yellow and black color specifications for caution signs. Signs should contain sufficient wording to identify the hazard and required protective action (e.g., "Hazardous Noise Area C Wear Hearing Protection At All Times When In This Area," or "Noise Hazard C Wear Hearing Protection When Operating").

### 3.3 Medical Surveillance

(5.1.1)

Line management shall apply medical surveillance according to the following.

1. Schedule a baseline audiogram for all employees identified as having noise exposure equal to or exceeding 85 dBA time-weighted average (regardless of the use of any hearing protection). This will place the employee in the medical surveillance program for hearing conservation provided by the occupational medical contractor.
  - a. The baseline audiogram must be obtained within six months of the employee's first exposure to noise at or above the allowable exposure of 85 dBA time-weighted average. This applies to new employees and employees re-assigned from jobs without hazardous noise exposure to jobs where their new exposure level equals or exceeds the threshold limit value.
  - b. Ensure the employee's baseline audiogram is preceded by at least 14 hours without exposure to workplace noise at or above the exposure limit (85 dBA time-weighted average). Properly selected and correctly worn hearing protectors may be used to achieve this requirement. Advise employees to avoid exposure to high levels of non-occupational noise (or noise from other employment) for 14 hours before each audiogram.
2. Obtain a new audiogram annually for each employee enrolled in the medical surveillance program.
3. When an employee in the hearing conservation program will no longer be exposed to noise at 85 dBA time-weighted average or above, discontinue the employee's participation in the hearing conservation program and document the basis for discontinuance.
4. Schedule the employee for a close-out audiogram when employment is terminated or employee is transferred to another contractor.
5. If the occupational medical contractor determines from the annual audiogram that a standard threshold shift has occurred, schedule a repeat audiogram within 30 days of the original to determine if the standard threshold shift is persistent.
6. Notify Industrial Hygiene that a standard threshold shift has occurred so that the employee's exposure, use, and adequacy of controls and hearing protection may be re-evaluated.
7. If the repeat audiogram shows that the standard threshold shift is persistent, notify the affected employee in writing within 21 working days of the repeat audiogram.

<b>ESHQ</b>	<b>Document</b>	<b>TFC-ESHQ-IH-STD-06, REV A-3</b>
	<b>Page</b>	<b>5 of 15</b>
<b>HEARING CONSERVATION PROGRAM</b>	<b>Effective Date</b>	<b>November 29, 2010</b>

NOTE: When the occupational medical contractor determines that a standard threshold shift has occurred, the occupational medical contractor will notify the employee's manager in writing so that the employee can be notified within the required 21 days. A separate letter will be included for the manager to give the employee. The occupational medical contractor will also notify the employee's manager and accident investigator within five working days of determining a threshold shift that is an average of 25 dB or greater at 2000, 3000, and 4000 Hz in either or both ears.

8. When a standard threshold shift is persistent, ensure the employee is trained in the proper use and care of hearing protectors. Require employees to wear hearing protectors until engineering or administrative controls are implemented so that they reduce noise exposure to 85 dBA or less.
9. Refer employees to the occupational medical contractor for evaluation if problems due to wearing hearing protectors (such as headaches, ear pain, irritation, or inability to hear signals) are reported or suspected.
10. Conduct a medical surveillance program for employees in the hearing conservation program, which includes the following in accordance with 29 CFR 1910.95.
11. Assist line management in scheduling employees for baseline, annual, repeat, and close-out audiograms through the medical scheduling system.
12. Confirm that the employee has been free from excessive noise exposure both at and away from work for 14 hours before the baseline audiogram. If the employee has been exposed to excessive noise during that period, inform line management and re-schedule the baseline audiogram.
13. Perform and evaluate audiograms in accordance with 29 CFR 1910.95.
14. Notify the employee's manager in writing when a standard threshold shift has occurred and express an opinion as to whether it is consistent with a noise causation or aggravation.
15. Refer the employee for evaluation by an audiological or otological specialist for consultation, as appropriate.
16. Inform line management, as appropriate, if:
  - Additional investigation indicates the standard threshold shift is not caused or aggravated by occupational noise
  - There is medical pathology other than hearing loss that may be aggravated by exposure to occupational noise or by wearing hearing protectors
  - There are any recommendations that pertain to occupational noise exposure.
17. Notify the employee's manager and the accident investigator within five working days after discovery that a potential OSHA recordable injury has occurred when a threshold shift is equal to or greater than an average of 25 dB at 2000, 3000, and 4000 Hz in either ear (calculated from the earliest baseline, allowing for presbycusis).
18. As requested, assist the accident investigator and industrial hygienist in determining the work-relatedness of the hearing loss.

### **3.4 Training**

Line management shall apply training standards according to the following.

1. Provide initial training on the following subjects for each newly enrolled employee in the hearing conservation program:
  - Effects of noise on hearing
  - Purpose of hearing protection
  - Advantages and disadvantages of various types of protection
  - Instructions on selection, fit, use, and care of protective devices
  - Purpose of audiometric testing and an explanation of the test procedure
  - Rights of workers to access records and federal hearing information releases
  - Where to obtain copies of this program and the OSHA standard.
2. Upon continued exposure to 85 dBA time-weighted average or greater, provide annual refresher training on the subjects above.

### **3.5 Industrial Hygiene Support**

Industrial Hygiene shall apply the following standards.

1. Assist line management in completing job hazard analyses, or other hazard identification processes, to identify operations that may potentially expose workers to 85 dBA time-weighted average or more, or an equivalent noise dose.
2. Conduct noise surveys and exposure monitoring in accordance with company-approved procedures such that noise monitoring data is collected in a technically and legally defensible manner.
3. Conduct walk-through surveys to determine changes in work activities or equipment that could affect noise exposure. Document qualitative assessments of noise hazards in accordance with company-approved procedures.
4. Recommend engineering and administrative controls and evaluate their effectiveness.
5. As requested, participate in pre-job and daily worker briefings on task-specific noise hazards, controls, and work practices, especially when changes are made to controls.
6. Based on noise survey, noise dosimetry data, or noise assessment results, notify line management of employees who need to be enrolled in the hearing conservation program, as well as those who no longer meet the exposure criteria for continued enrollment.

#### 4.0 DEFINITIONS

Audiogram. A chart, graph, or table presenting the results from an audiometric test, showing an individual's hearing threshold levels as a function of frequency.

Baseline audiogram. An audiogram against which future audiograms are compared.

decibel (dB). Unit for expressing the relative sound pressure level on a logarithmic scale from zero for the average least perceptible sound to about 130 for the average pain level.

(dBA) A-weighted sound pressure level. Sound pressure level measured on the "A" frequency weighting scale of a standard sound level meter. This scale approximates the response of the human ear to noise at lower levels, by selectively responding to higher sound frequencies (which are more damaging than lower frequencies).

Dose. The measure of exposure to noise energy with reference to the stated threshold limit value. For example: a 100% threshold limit value dose is equivalent to 85 dBA as an 8-hour time-weighted average; a worker exposed to 85 dBA for 4 hours has received 50% of the allowable dose, and a worker exposed to 88 dBA for 4 hours has received 100% of the allowable dose.

Exchange rate. The rate at which an increase in noise level is "exchanged" for decreased exposure time, or conversely, a decrease in noise level is exchanged for a longer exposure time. A 3 dB exchange rate results in cutting the allowable exposure time in half when the noise energy doubles (e.g., increases by 3 dB).

Exposure assessment. Determinations of potential and actual exposure to noise, including initial and subsequent qualitative and quantitative exposure assessment activities.

Impulse or impact noise. Variations in noise levels that involve maxima at intervals of greater than one second. When the intervals are less than one second, the noise is considered to be continuous.

Noise reduction rating (NRR). The amount of attenuation in decibels provided by hearing protectors with individual pure tones in a test chamber without echoes or reflections. This number must be adjusted downward in consideration of actual noise exposure situations.

Noise (hazardous noise). Noise levels equal to or exceeding 85 dBA time-weighted average, or an equivalent noise dose.

OSHA recordable threshold shift. Generally, a threshold shift of 25 dB average at 2000, 3000, and 4000 Hz or greater when compared with the original (earliest) baseline audiogram, allowing for presbycusis.

Standard threshold shift (STS). Change in hearing threshold relative to the baseline audiogram of an average of 10 dB or more at 2000, 3000, and 4000 Hz or greater in either ear and accounting for presbycusis.

Threshold limit value (TLV). The sound level in dBA to which workers may be exposed for a specified duration which will protect most workers against hearing loss over a working lifetime.

Time-weighted average (TWA). The average sound pressure level incorporating varying exposure levels weighted by their duration during the work shift.

**5.0 SOURCES****5.1 Requirements**

1. 29 CFR 1910, Subpart G, Section 95, "Occupational Noise Exposure."
2. 29 CFR 1926, Subpart D, Section 52, "Occupational Noise Exposure."
3. 29 CFR 1926, Subpart E, Section 101, "Hearing Protection."
4. ACGIH, "Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices."
5. 10 CFR 851, "Safety and Health Standards."



**ATTACHMENT A - APPLYING THE HEARING CONSERVATION PROGRAM**

1. Table A-1 should be used in determining if worker exposures are acceptable. The duration given in the table at each sound level represents a noise dose equal to 85 dBA time-weighted average. Both the sound pressure level and the duration an employee is required to work in the noisy environment are used to determine if the exposure equals or exceeds 85 dBA time-weighted average, or the equivalent noise dose.
2. If the daily noise exposure is composed of two or more periods of noise exposure of different sound pressure levels, combine the periods in the following equation:

$$W_h \left( \frac{C^1}{T^1} + \frac{C^2}{T^2} + \frac{C^3}{T^3} + \dots + \frac{C^{11}}{T^{11}} \right) \times 100 = \text{percent of allowable dose}$$

where:

C = total duration (hours, minutes or seconds) of exposure at a specific sound pressure level

T = allowable exposure duration (hours, minutes or seconds) from Table A-1.

3. If the sum of these fractions is greater than one (i.e., unity), the combined exposure exceeds the exposure dose limit of 85 dBA time-weighted average. Multiplying the sum of fractions by 100 will convert the answer to percent of the allowable dose.

**Table A-1. Exposure Limits for Noise.<sup>a</sup>**

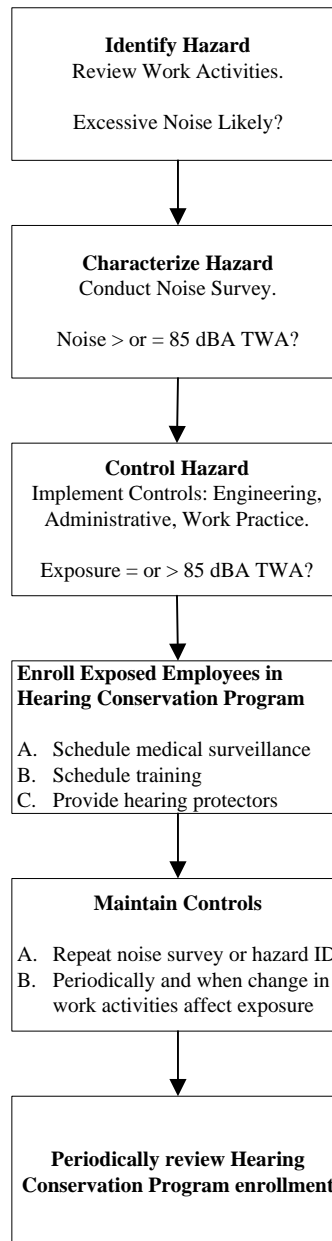
Hours per day	Sound level dBA	Minutes per day	Sound level dBA	Seconds <sup>b</sup> per day	Sound level dBA
24	80	30	97	28.12	115
16	82	15	100	14.06	118
8	85	7.50 <sup>b</sup>	103	7.03	121
4	88	3.75 <sup>b</sup>	106	3.52	124
2	91	1.88 <sup>b</sup>	109	1.76	127
1	94	0.94 <sup>b</sup>	112	0.88	130
				0.44	133
				0.22	136
				0.11	139

<sup>a</sup> No exposure to continuous, intermittent, impulse, or impact noise in excess of a peak C-weighted level of 140 dB.

<sup>b</sup> Limited by duration of the noise source--not by administrative control. (Administrative control is not effective for these exposures because of the difficulty in limiting short stay times).

## ATTACHMENT A - APPLYING THE HEARING CONSERVATION PROGRAM (cont.)

Figure A-1. Applying the Hearing Conservation Program.



**Table 1. Approved Hearing Protectors.**

Hearing Protector	Manufacturer	Noise Reduction Rating (dB) <sup>1</sup>
<b>PLUGS</b>		
Bilsom Ultra Soft 5100-02	Bilsom International 109 Carpenter Dr. Sterling, VA 22170 (800) 733-1177	26
Bilsom Prefit 5603	Bilsom International	26
Bilsom Soft 5120-02	Bilsom International	26
E.A.R.	E.A.R. Division, Cabot Corp. 7911 Zionsville Rd. Indianapolis, IN 46268	29
E.A.R. Tapefit	E.A.R. Division, Cabot Corp.	29
Elvex Blue Foam	Elvex Corporation 7 Trowbridge Dr. P.O. Box 850 Bethel, CT 06801 (800) 888-6582	29
Max Foam	Howard S. Leight & Assoc. 4061 Glencoe Ave. Marina Del Rey, CA 90292 (213) 827-3838	33
Max Lite Low Pressure Foam	Howard S. Leight & Assoc.	30
Purafit Model 6800	Moldex Metric Inc. 4761 Leahy St. Culver City, CA 90232 (800) 421-0668	31
Quiet Ear Plugs	Howard S. Leight & Assoc.	26
<b>CUSTOM MOLDED PLUGS</b>		
OTO-PRO	Hearing Conservation Products, Inc. 107 West Broadway Clarksville, TX 75426	31.3
<b>BAND STYLE PLUGS</b>		
Caboflex Model 600	E.A.R. Division, Cabot Corp.	20 (under chin)
Moldex Model 6900	Moldex Metric, Inc.	31
Quiet QB2	Howard S. Leight & Assoc.	24 (behind neck) 25 (under chin)

**Table 1. Approved Hearing Protectors. (cont.)**

Hearing Protector	Manufacturer	Noise Reduction Rating (dB) <sup>1</sup>
Silent Band-It	North Health Care 1515 Elmwood Road Rockford, IL 61103 (815) 282-1650	25
<b>MUFFS</b>		
Bilsom Universal Muff 2308	Bilsom International	25 (over head) 23 (behind head)
E.A.R. Industrial Earmuffs Model 1000	E.A.R. Division, Cabot Corp.	25 (over head) 26 (behind head or under chin)
E.A.R. Industrial Earmuffs Model 3000	E.A.R. Division, Cabot Corp.	25
Noisefoe Mark V	MSA MSA Bldg., P.O. Box 426 Pittsburgh, PA 15230 (800) 672-2222	24 (over head, under chin, or behind neck)
Wilson 356A	Wilson Safety Products	26 (over head)
AO 1776K and AO 1720	American Optical Safety Products South Bridge, MA 01550  <b>NOTE:</b> Manufacturer has discontinued product line; however, these models may still be used in the workplace.	

**Table 2. Approved Hearing Protectors Available From Stores.**

Stores Number	Product Name, Model, and Manufacturer	Noise Reduction Rating (dB) <sup>1</sup>
37-5500-010	Muffs- Bilsom Warrior, Model 2424	23
37-5500-010	Muffs- Howard Leight, QM 26 (or approved equivalent)	25
37-7100-300	Plugs, soft, reusable, with cord and carrying case- Howard Leight, #LHAS-3OR (or approved equivalent)	27
37-7100-400	Plugs, disposable, pre-shaped, rolls extremely small for use by wearers with small ear canals-Howard Leight, #MAX-1 (or approved equivalent)	33
37-7100-500	Plugs, disposable, to be used with dispenser-Howard Leight, #MAX-2-D	32

**ATTACHMENT B - METHODS FOR ESTIMATING THE ADEQUACY OF HEARING  
PROTECTOR ATTENUATION**

29 CFR 1910.95 Appendix B: Methods For Estimating the Adequacy of Hearing Protector Attenuation provides information on how to determine the adequacy of hearing protector attenuation using the noise reduction rating (NRR) of a given hearing protector. Use the following formulas to estimate the attenuation afforded to a noise-exposed employee in a work environment by muffs, plugs, or a combination of both.

1. For **single protection** (either muffs or plugs):

- a. Determine Noise Reduction Rating (NRR) as determined by the manufacturer.
- b. Subtract the NRR from the noise data

i. If using C-weighted, TWA noise data, then perform the following calculation:

$$\text{Estimated Exposure (dBA)} = \text{TWA (dBC)} - \text{NRR}$$

**OR**

ii. If using A-weighted TWA noise data, then subtract a 7 dB correction factor from the NRR, as follows:

$$\text{Estimated Exposure (dBA)} = \text{TWA (dBA)} - (\text{NRR} - 7)$$

*Example:* TWA=100 (dBA), muff NRR = 19 dB

*Estimated Exposure = 100 - (19-7) = 88 dBA*

2. For **dual protection** (ear muffs and plugs are used simultaneously):

- a. Determine Noise Reduction Ratings (NRR) as determined by the manufacturer for each hearing protection device.
- b. Chose the hearing protection device with the higher NRR rating (called NRRh).
- c. Subtract the NRRh from the noise data, as follows:

i. Using C-weighted noise data noise

$$\text{Estimated Exposure (dBA)} = \text{TWA (dBC)} - (\text{NRRh} + 5)$$

**OR**

ii. Using A-weighted noise data noise

$$\text{Estimated Exposure (dBA)} = \text{TWA (dBA)} - [(\text{NRRh} - 7) + 5]$$

*Example:* TWA=110 dBA, plug NRR=29, and muff NRR=25 dB

*Estimated Exposure = 110 - [(29 - 7) + 5] = 83 dBA*

**ATTACHMENT B - METHODS FOR ESTIMATING THE ADEQUACY OF HEARING  
PROTECTOR ATTENUATION (cont.)**

3. OSHA's **experience** and the published scientific literature have shown that laboratory-obtained real ear attenuation for HPDs can seldom be achieved in the workplace. To adjust for workplace conditions, OSHA strongly recommends applying a 50% correction factor when estimating field attenuation. This is especially important when considering whether engineering controls are to be implemented. The equations above would then be modified as follows:

**a.** Single Protection:

Estimated Exposure (dBA) = TWA (dBC) - [NRR x 50%], or

Estimated Exposure (dBA) = TWA (dBA) - [(NRR - 7) x 50%]

**b.** Dual Protection:

Estimated Exposure (dBA) = TWA (dBC) - [(NRRh x 50%) + 5] , or

Estimated Exposure (dBA) = TWA (dBA) - {[ (NRRh - 7) x 50% ] + 5 }